Docket No. 0756-1799

#36
Hedge
8/28/02

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of)
Mitsunori SAKAMA)
Serial No. 09/070,908)
Filed: May 4, 1998)
For: FILM FORMING METHOD AND)
FILM FORMING APPARATUS)
)

Art Unit: 1762
Examiner: M. Padgett

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with The United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231, on 8/19/02

RESPONSE

COPY OF PAPERS ORIGINALLY FILED

Honorable Commissioner of Patents
Washington, D.C. 20231

Sir:

The Official Action mailed March 13, 2002 and the Supplemental Official Action mailed April 16, 2002 have been received and their contents carefully noted. It was understood in a telephone conference with Examiner Padgett on April 22, 2002 that the period for response was restarted to run from the mailing date of the Supplemental Official Action on April 16, 2002. Filed concurrently herewith is a *Request for One Month Extension of Time* which extends the shortened statutory period for response to August 16, 2002. Accordingly, Applicant respectfully submits that this response is being timely filed.

Applicant notes with appreciation the consideration of the Information Disclosure Statement filed on February 12, 2002.

Claims 23-29, 31-50 and 58-129 are pending in the present application, of which claims 23-29, 58, 64, 70, 76, 82, 87, 92 and 98 are independent. For the reasons set forth in detail below, these claims are believed to be in condition for allowance.

The present invention generally relates to a film forming method for use in fabricating, for example, a thin film transistor. As noted on page 2 of the Official Action, some of the pending claims are not limited to the formation of a thin film transistor (TFT), but rather more broadly recite a film forming method.

Several features of the present invention are discussed below in connection with a timing chart shown in Figure 7 of the present application. In forming a film such as a semiconductor film by a plasma CVD method, a discharge gas such as hydrogen gas is supplied into a chamber to cause radio frequency discharge. When the radio frequency discharge becomes stable, a reactive gas, such as silane gas, is supplied into the chamber at the same flow rate as the supply of the discharge gas to form the semiconductor film by decomposing the reactive gas. Also, the supply of the discharge gas is stopped during the film formation. In accordance with one aspect of the present invention, an overall flow rate of gases supplied in the chamber is maintained during a transition from the discharge gas to the reactive gas. As a result, it is possible to eliminate instability at a start of the radio frequency discharge, and film formation can be carried out in a state where the radio frequency discharge remains stable.

Furthermore, upon completion of the film formation, the supply of the reactive gas is stopped in the state where the radio frequency discharge is maintained, and a discharge gas is supplied into the chamber at the same flow rate as the reactive gas. An overall flow rate of gases supplied in the chamber is maintained during a transition from the reactive gas to the discharge gas. For a predetermined period of time, plasma is maintained in the chamber without film formation. The radio frequency discharge is stopped in a state where minute particles in the chamber are exhausted. In this way, adherence of minute particles to the formed surface can be avoided.

Paragraph 2 of the Official Action rejects claims 23-29, 45-50, 58-59, 61-65, 67-82, 84-87, 87-104, 106-110 and 113-129 as obvious based on the combination of U.S. Patent 5,420,044 to Kozuka; U.S. Patent 6,289843 B1 to Gupta and U.S. Patent 5,456,796 to Gupta et al.

As stated in MPEP § 2143-2143.01, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Obviousness can only be established by combining or modifying the

teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab,* 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

For the reasons that follow, it is respectfully submitted that the Official Action has failed to establish a *prima facie* case of obviousness and reconsideration is respectfully requested in view thereof. Kozuka discloses that the raw material gas is preferably used not singly but as a mixture with a diluting gas during the film formation (column 4, lines 40-42). On the other hand, in accordance with the presently claimed invention, the discharge gas is not mixed with the reactive gas, which is clearly recited in all of the independent claims. After quoting from this portion of Kozuka and emphasizing the word "preferably," the Official Action asserts on page 3 that "it is noted that preferably does not mean its necessary, but that its optional and singly is possible, if not preferred." It is respectfully submitted, however that this is a non sequitur. Kozuka clearly states that it is preferable that the raw material gas is used as a mixture with a diluting gas. While this may not mean it is necessary, there is no logical inference in the reference that supports a conclusion that one of skill in the art would conclude that this would be optional, and thus using the gas alone could be possible, if not preferred. The Official Action takes the clear, literal disclosure of Kozuka that a mixture is preferred and apparently concludes that using the gas alone (singly) may be preferred. It is respectfully submitted that this goes beyond the reasonable interpretation of the disclosure of Kozuka as a whole and that the conclusion that the diluting gas of Kozuka need not have been mixed with reactant gas is based on the hindsight because Kozuka fails to disclose or suggest that the discharge gas is not mixed with the reactive gas.

Furthermore, "preferable" has at least one definition of "more desirable or worthy than another." (www.dictionary.com). Thus, it is submitted that Kozuka, when taken for

all that it discloses, clearly teaches one of skill in the art that the use of a mixture of raw material gas and diluting gas is more desirable than the use of a raw material gas alone. In this regard, Applicant believes that Kozuka in fact teaches away from the claimed invention, even if the diluting gas of Kozuka is equivalent to the discharge gas of the subject application.

According to pages 5-6 of the Official Action, Gupta '843 is relied upon for providing both teaching and motivation to maintain uniform flow of gases between steps. All of the independent claims recite that an overall flow rate of gases supplied in the chamber is maintained during a transition from the discharge gas to the reactive gas or from the reactive gas to the discharge gas. This feature is supported by the timing chart of Figure 7 and on page 19, lines 10-16 of the specification. On the other hand, although Gupta '843 may teach that a rate during step 215 is substantially equal to a rate in step 230 in column 5, lines 45-49, it appears that none of the references, including Gupta '843, teach the features that an overall flow rate of gases supplied in the chamber is maintained during a transition from the discharge gas to the reactive gas or from the reactive gas to the discharge gas.

In view of the above arguments, it is respectfully submitted that a *prima facie* case of obviousness cannot be maintained. The cited references, taken alone or in combination, fail to teach or suggest all the claim limitations. Specifically, the cited prior art fails to disclose or suggest a discharge gas is not mixed with a reactive gas, or that an overall flow rate of gases supplied in the chamber is maintained during a transition from the discharge gas to the reactive gas or from the reactive gas to the discharge gas.

Furthermore, it is respectfully submitted that there has been an insufficient showing that one of skill in the art would have been motivated to modify the reference or to combine reference teachings to achieve the claimed invention. Kozuka clearly expresses a preference for the use of a gas mixture. Furthermore, the Official Action states that "either Gupta et al. shows that it is possible to achieve the objective of Kozuka . . . via switching from inert gas to reactant gas, instead of maintaining the inert or diluent gas flow throughout the sequence." While the Official Action relies on various teachings of the cited prior art to disclose aspects of the claimed invention and asserts that these aspects could be used together, it is submitted that the Official Action does

not adequately set forth why one of skill in the art would combine the references to achieve the present invention. It is unclear why one of skill in the art would look to Gupta to modify the teachings of Kozuka and to "achieve the objectives of Kozuka" when those objectives are already met by the disclosure of Kozuka. MPEP § 2142 states: "The initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done. 'To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.' *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985)."

Furthermore, the fact that references can be combined or modified is not sufficient to establish *prima facie* obviousness. The mere fact that it is "possible" to combine or modify the references does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). See MPEP 2143.01. It is respectfully submitted that the teachings of Kozuka and Gupta are insufficient to teach or suggest to one of skill in the art that a discharge gas should not be mixed with a reactive gas, or that an overall flow rate of gases supplied in the chamber is maintained during a transition from the discharge gas to the reactive gas or from the reactive gas to the discharge gas. At best, the prior art of record teaches that a discharge gas might be mixed with a reactive gas, or that an overall flow rate of gases supplied in the chamber might be maintained during a transition from the discharge gas to the reactive gas or from the reactive gas to the discharge gas, but not that the should be. See MPEP 2143.01, under the heading *FACT THAT REFERENCES CAN BE COMBINED OR MODIFIED IS NOT SUFFICIENT TO ESTABLISH PRIMA FACIE OBVIOUSNESS*, wherein it is stated that "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.

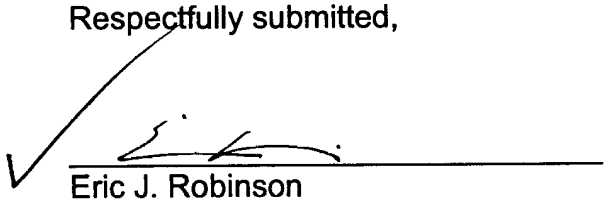
Paragraph 3 of the Official Action rejects claims 31-44 as obvious based on the combination of Kozuka, Gupta, U.S. Patent 5,366,926 to Mei et al., U.S. Patent

5,346,850 to Kaschmitter et al. and U.S. Patent 5,313,076 to Yamazaki et al. It is respectfully submitted that these references do nothing to overcome the deficiencies noted above and that these claims are allowable for the same reasons.

Paragraph 3 of the Supplemental Official Action mailed April 16, 2002 rejects claims 23-29, 45-50, 58-104, 106-110 and 113-129 under the doctrine of obviousness-type double patenting over claims 1-63 or claims 1-5, 12-21 and 27-30 of U.S. Patent 6,281,147 to Yamazaki et al. or U.S. Patent 6,015,762 to Yamazaki et al., respectively in view of Gupta '843, and optionally considering Kozuka. It is respectfully submitted that this rejection is not appropriate since none of the above patents discloses or claims the features of the present invention that an overall flow rate of gases supplied in the chamber is maintained during a transition from the discharge gas to the reactive gas or from the reactive gas to the discharge gas as discussed above. Therefore, it is believed that the subject application is patentably distinct from either the '147 or the '762 patent and that there would not be any timewise extension of the patent monopoly, the touchstone of double patenting, by issuance of the subject application. Favorable reconsideration is requested.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact Applicant's undersigned attorney at the telephone number listed below.

Respectfully submitted,



Eric J. Robinson
Reg. No. 38,285

Robinson Intellectual Property Law Office, P.C.
PMB 955
21010 Southbank Street
Potomac Falls, Virginia 20165
(571) 434-6789